KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

FC-10ETH
Ethernet Controller

P/N: 2900-000086 Rev 2

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Products.

Congratulations on purchasing your Kramer **FC-10ETH** Ethernet Controller, which is ideal for use with Ethernet / RS-232 interfaces and/or Ethernet / RS-485 interfaces.

The package includes the following items:

- **FC-10ETH** Ethernet Controller
- Power adapter (12V DC Input)
- Windows ®-based Configuration Manager
- Null-modem adapter
- This user manual

1.1 Terminology Used in this User Manual

Term	Definition
802.3	The standard specification for ETHERNET that is maintained by the Institute of Electrical and Electronics Engineers (IEEE).
Dynamic Host Configuration Protocol (DHCP)	Allows the network administrator to distribute IP addresses from a central point and automatically send a new IP address when an Ethernet point is plugged into a different network location.
Gateway	A network position serving as an entry to another network. On the Internet, a node or stopping point can be either a gateway node or a host (end-point) node.
IP Address	A 32-binary digit number that identifies each sender or receiver (within a network via a particular server or workstation) of data (HTML pages or e-mails) that is sent in packets across the Internet. Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit.
Local Area Network (LAN)	Computers sharing a common communications line or wireless link, which often share a server within a defined geographic area.
Media Access Control (MAC) Address	A computer's unique hardware number (or address) in a LAN or other network. On an Ethernet LAN, the (MAC) address is identical to the Ethernet address.
Transmission Control Protocol/Internet Protocol (TCP/IP)	The basic communication language or protocol of the Internet that breaks the message into appropriately sized packets for the network, and can be used as a communications protocol in an intranet or an extranet.

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables

Go to http://www.kramerelectronics.com to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **FC-10ETH** away from moisture, excessive sunlight and dust

Caution: No operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

3 Overview

The high performance **FC-10ETH** Ethernet Controller is an easy-to-use, bidirectional hardware and software interface system for controlling Kramer (and also non-Kramer) RS-232 and/or RS-485 controllable machines via Ethernet LAN, as well as via the Internet. In particular, the **FC-10ETH**:

- Offers network connectivity that lets you connect a Kramer (or other) device via its RS-232 or RS-485 port to the Ethernet LAN network
  The FC-10ETH data buffer is limited to 128 bytes
- Lets you control two RS-232 devices (or one RS-232 device and one RS-485 device) via Ethernet, from a PC (set to the Passive routing mode) or other protocol compatible remote controller
- Lets you control a device from up to five Ethernet points (PCs or remote controllers)
- Includes Windows®-based Configuration Management software for configuring the **FC-10ETH** unit (including routing mode settings, network settings, serial settings, and destination device settings)
- Supports easy dial-up and Internet system remote control (requiring only a dedicated IP address and a modem in the remote location) whether it is a standalone PC or a LAN system
- Supports using wireless, 802.11b standard based LAN systems
- Has a 128-byte data buffer making it compatible with most non-Kramer protocols
- Can be rack mounted in a 1U rack space with the optional **RK-3T** rack adapter (up to 3 units can be rack mounted side−by−side)

The **FC-10ETH** includes the Virtual Serial Port Manager (Kramer VSPM) for compatibility with applications based on COM-port communication. The virtual serial port:

- Makes the **FC-10ETH** compatible with all Windows®-based applications which work through an actual COM port. This includes all versions of K-Router and other Kramer control applications. It lets you operate all RS-232 and RS-485 controllable devices via Ethernet LAN using their existing PC software

- Operates like an actual hardware port, that is, a logical COM that behaves like a standard hardware COM but in reality transparently reroutes the data using the TCP/IP network to the **FC-10ETH** interface via a Virtual null-modem connection, which you can emulate over the Ethernet or Internet
- Can be created in any quantity on your PC and does not occupy an actual serial port

3.1 Defining the FC-10ETH Ethernet Controller Front Panel

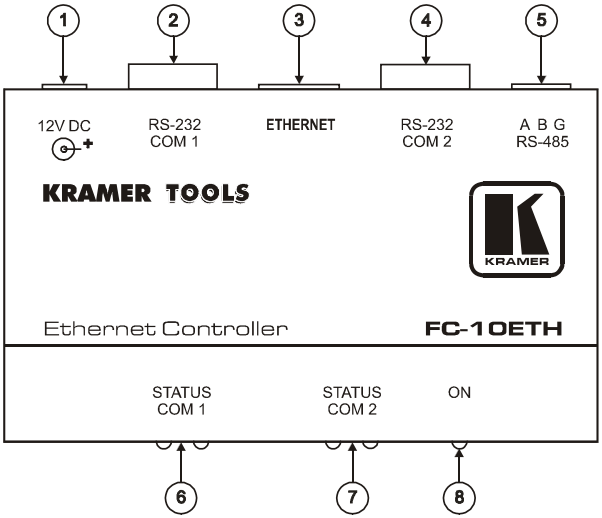

Figure 1: FC-10ETH Ethernet Controller

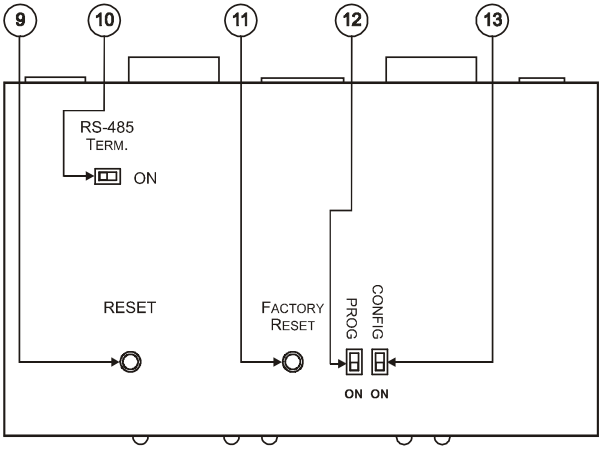

Figure 2: Underside of the FC-10ETH Ethernet Controller

#	Feature	Function
1	*12V DC*	+12V DC connector for powering the unit
2	*RS-232 COM 1* Port	Connects to the RS-232 9-pin D-sub port on the Kramer (or other) device 1 or PC
3	*ETHERNET* Port	Connects to your LAN
4	*RS-232 COM 2* Port	Connects to the RS-232 9-pin D-sub port on a Kramer (or other) device 2 or PC A Kramer device can be connected to either the RS-232 COM 2 port, or to the RS-485 terminal block port (but not to both)
5	*RS-485* Terminal Block Port	Connects to the RS-485 port on a Kramer (or other) device A Kramer device can be connected to either the RS-232 COM 2 port, or to the RS-485 terminal block port (but not to both) PIN A connects to the “A” (+) PIN; PIN B connects to the “B” (–) PIN (and PIN G connects to the “G (Ground)” PIN, if necessary) The connection to G is usually not necessary for RS-485
6	*STATUS COM 1* LEDs	Lit when a signal is transmitted or received from port 1 (mostly used for troubleshooting)
7	*STATUS COM 2* LEDs	Lit when a signal is transmitted or received from port 2 (mostly used for troubleshooting)
8	*ON* LED	Lit when receiving power
9	*RESET* Button	Press to reset the machine Turns the machine off and on again while retaining its definitions (identical to disconnecting the power adapter and then connecting it again)
10	*RS-485 TERM.* Button	Press for BUS termination: Set to OFF if the RS-485 terminal block port is not connected Set to ON if the RS-485 terminal block port is connected
11	*FACTORY RESET* Button	Press to reset to factory default definitions First disconnect the power adapter and then connect it again while pressing the FACTORY RESET button. The unit will power up and load its memory with the factory default definitions
12	*PROG* Switch	Switch ON to upgrade firmware
13	*CONFIG* Switch	Not used, set to OFF

4 Configuring the FC-10ETH Ethernet Controller

This section describes:

- How to connect the **FC-10ETH** for configuration, via its ETHERNET port (see Section 4.1)
- How to install and run the Configuration Manager software (see Section 4.2)
- The Configuration Manager Window features (see Section 4.2.1)

4.1 Operating via the ETHERNET

You can connect to the **FC-10ETH** via Ethernet using either of the following methods:

- Direct connection to the PC using a crossover cable (see Section 4.1.1)
- Connection via a network hub, switch, or router, using a straight-through cable (see Section 4.1.2)

4.1.1 Connecting the ETHERNET Port Directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **FC-10ETH** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the **FC-10ETH** with the factory configured default IP address.

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
   The Local Area Connection Properties window appears.

5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button (see Figure 3).

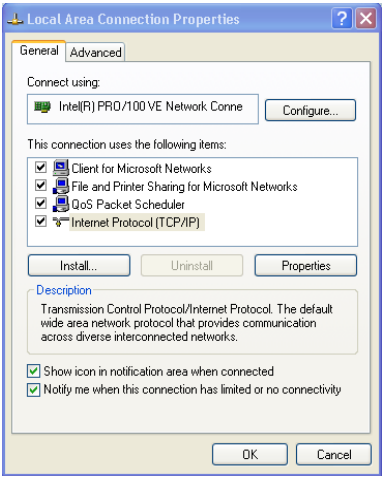

Figure 3: Local Area Connection Properties Window

6. Select Use the following IP Address, and fill in the details as shown in Figure 4.

7. Click **OK**.

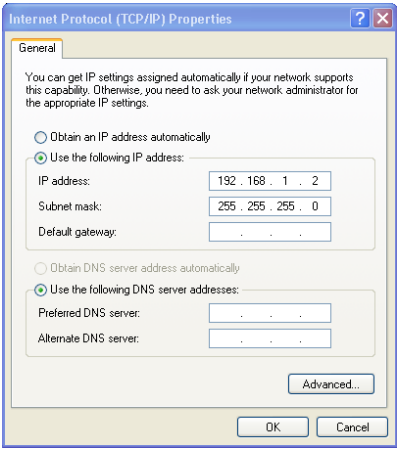

Figure 4: Internet Protocol (TCP/IP) Properties Window

4.1.2 Connecting the ETHERNET Port via a Network Hub (Straight-Through Cable)

You can connect the Ethernet port of the **FC-10ETH** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

4.1.3 Control Configuration via the Ethernet Port

To control several units via the Ethernet, connect the Master unit (Machine # 1) via the Ethernet port **to the** LAN port of your PC. Use your PC initially to configure the settings (see Section 4.1).

4.2 Installing and Configuring the FC-10ETH

To configure the **FC-10ETH** via the ETHERNET, do the following:

1. Connect the **FC-10ETH** as described in Section 4.2 (see Figure 5)
2. Insert the CD-ROM in the CD-ROM drive, double click the Setup.exe file and follow the on-screen instructions.
3. Click the appropriate shortcut in the Start menu's Programs folder.
   The **FC-10ETH** Configuration Manager window (see Figure 6) opens.
4. Click the Search button to automatically search for devices (or the Action menu's, Search Board command).
   The MAC Address for the found "**FC-10ETH**" appears in the Device List.
5. Change the settings according to your network requirements and then click the Config button (or the Action menu's, Config command) to apply the settings.

Note that clicking the Config button will alter the IP settings of the **FC-10ETH**.

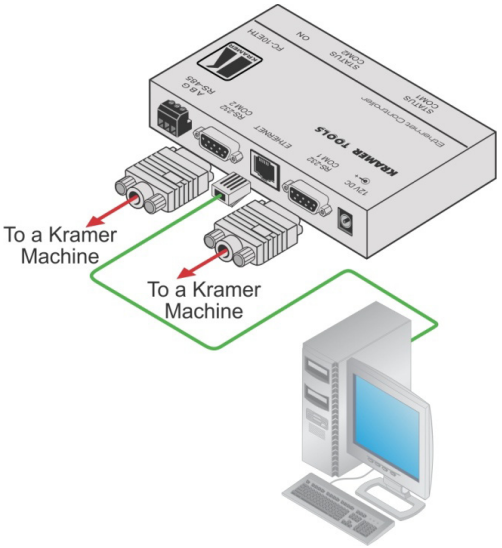

Figure 5: Connecting the FC-10ETH for Configuration

4.2.1 The Kramer Configuration Manager Window

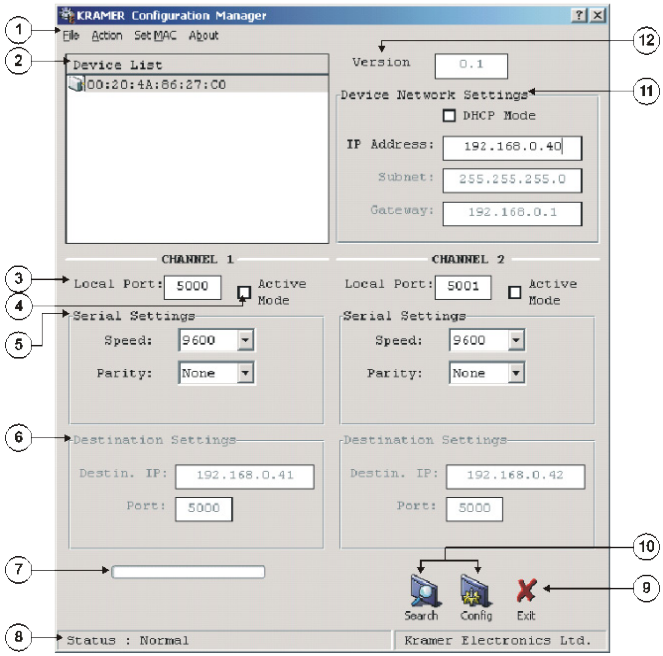

Figure 6: FC-10ETH Configuration Manager Window

#	Feature		Function
1	Menu bar	File	**Exit**: closes the Configuration Manager application
		Action	**Search Board**: seeks the **FC-10ETH** devices that connect to the PC via the ETHERNET port, and displays them and their corresponding settings **Config**: adjusts the **FC-10ETH** according to the displayed data
		Set MAC	For factory use only Click the Password command to enter the password
		About	Displays software development information, including the software version
2	Device List		Displays the MAC Addresses for the **FC-10ETH** devices, connected via the selected port (LAN or COM)
3	*CHANNEL 1 / CHANNEL 2*	Local Port	An address (for the local ports COM 1 and COM 2) on the **FC-10ETH** device that is currently being configured, which provides a direct route from another Ethernet point application
4		Active Mode Check Box	When selected, activates the Active mode (see Section 4.3.2) When cleared, activates the Passive mode (see Section 4.3.1)
5		Serial Settings Area	**Speed** list: click the appropriate baud speed (1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200) The configuration baud is factory preset, and fixed, at 9600 **Parity** list: click the required parity (None, Odd, Even, Mark or Space)
6		Destination Settings Area	**Destin. IP**: a 32-binary digit number that identifies the destination **FC-10ETH** device in the Ethernet or Internet **Port**: a pre-assigned address of the destination **FC-10ETH** device that provides a direct route to its Transport layer The Destination Settings area is active only when the Active Mode check box is selected
7	Progress Bar		Shows the progress
8	Status Bar		Shows the status
9	Exit Button		Closes the Configuration Manager application
10	Action Buttons		**Search**: seeks the **FC-10ETH** devices that connect to the PC via the ETHERNET port, and displays them and their corresponding settings **Config**: adjusts the **FC-10ETH** according to the displayed data
11	Device Network Settings Area		**DHCP Mode** Check Box: When selected, automatically configures the **FC-10ETH** to obtain an IP address from the network administrator via the Dynamic Host Configuration Protocol (DHCP). When cleared, manual configuration of the **FC-10ETH** is required to obtain an IP address (Static IP) **IP Address**: A 32-binary digit number obtained from your Network Administrator that identifies the **FC-10ETH** device that is currently being configured in the Ethernet or Internet **Subnet**: A 32-binary digit number obtained from your Network Administrator, which combined with the IP Address, identifies which network your **FC-10ETH** device is on **Gateway**: A network position serving as an entry to another network or to the Internet (only relevant in the Active Routing mode)
12	Version		Displays the firmware version

4.3 Routing Data in the Passive and Active Routing Modes

The **FC-10ETH** routes data in either the Passive Routing Mode (see Section 4.3.1) or the Active Routing Mode (see Section 4.3.2).

4.3.1 The Passive Routing Mode

In the Passive routing mode, the **FC-10ETH** never opens the Ethernet communication first, and only replies to the connection requests coming from the active remote stations. Serial data that is received at the serial port of the **FC-10ETH,** before the remote station contacts the **FC-10ETH**, is discarded.

In the Passive mode, the **FC-10ETH** will work with any station on the network that contacts it (but not more than five stations simultaneously, three via COM 1 and two via COM 2), as the example in Figure 7 illustrates.

To configure the **FC-10ETH** to the Passive mode, connect it and do the following:

1. Press the Search button to find the device connected to the PC.
2. Set the IP address number according to your network requirements.
3. Clear the Active Mode check box (if selected) in the configuration manager.
4. Press the Config button to accept changes.

4.3.2 The Active Routing Mode

In the Active routing mode, the **FC-10ETH** does not wait for the remote station to send the connection request first, it sends the connection request and routes the data in the destination device direction as soon as there is data to be sent. The data is always sent to a specific destination (as defined by the Destination IP address and the Destination Port Number Settings of the **FC-10ETH**).

To configure the **FC-10ETH** to the Active mode, connect it and do the following:

1. Press the Search button to find the device connected to the PC.
2. Set the IP address number according to your network requirements.
3. Select the Active Mode check box in the configuration manager.

4. Set the Destin. IP and Port in the Destination Settings Area, for CHANNEL 1 and CHANNEL 2.

5. Press the Config button to accept changes.

5 Controlling Machines via the Ethernet using the FC-10ETH

You can use your **FC-10ETH** to control a Kramer or non-Kramer RS-232/RS-485 machine:

- From computers that connect to a LAN, as well as via an Internet connection (see Section 5.1)
- Via a controller, as well as via an Internet connection (see Section 5.2).

5.1 Controlling a Machine via a Computer

To control a Kramer machine via five computers, as illustrated in the example in Figure 7, do the following:

1. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity.
2. Configure the **FC-10ETH** to the Passive routing mode (see Section 4.3.1).
3. Connect up to two machines, that is, connect the RS-232:
   - COM 1 port of the **FC-10ETH** to the RS-232 port of your Kramer/non-Kramer machine (1) via a Null modem
   - COM 2 port of the **FC-10ETH** to the RS-232 port of your Kramer/non-Kramer machine (2) via a Null modem (alternatively, you can connect the RS-485 terminal block port of the **FC-10ETH** to the RS-485 port of your Kramer/non-Kramer machine)

     To connect the RS-485 block port, Connect PIN A to the “A” (+) PIN and PIN B to the “B” (–) PIN.
4. Connect the ETHERNET port of your **FC-10ETH** to a LAN, using a straight-through cable with RJ-45 connectors.

   You can control from up to five computers (three via COM1 and two via COM 2), each with its control software.
5. Run the Kramer Windows®-based control software to control the Kramer machine from each computer.

   When working with a non-Kramer device, use that device’s PC software.

6. Select either:

   - A virtual COM port if the control application cannot directly connect to the Ethernet driver (see Section 5.1.1), or
   - An Ethernet port connection if the control application can directly connect to the Ethernet driver (see Section 5.1.2)

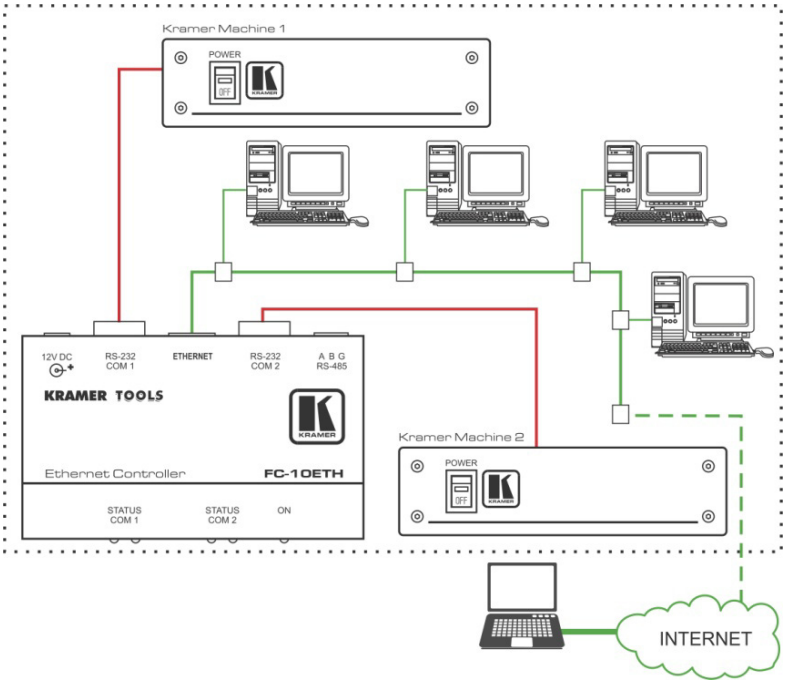

Figure 7: Connecting the FC-10ETH in the Passive Routing Mode

5.1.1 Setting a Virtual Port

If the control application cannot work with an Ethernet driver, download the Kramer VSPM from our Web site to set a virtual port for each local port on your **FC-10ETH**.

The **Kramer VSPM** software lets you emulate virtual ports which normally would be present in the machine hardware. After setup, the virtual port lets you control Kramer machines via your PC.

5.1.2 Setting an Ethernet Connection

If the control application can directly connect to the Ethernet driver, select the host IP and port number according to your **FC-10ETH** configuration, as illustrated in Figure 8.

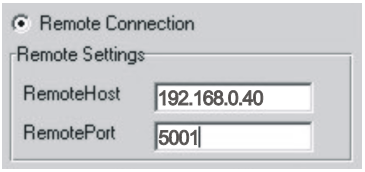

Figure 8: The Port Window – Selecting a Remote Connection

5.2 Controlling a Kramer Machine via a Serial Controller

To control a Kramer machine via serial controllers (in the Active routing mode), as illustrated in the example in Figure 9, do the following:

1. Connect the **FC-10ETH (A)** 12V DC power adapter to the power socket and connect the adapter to the mains electricity.
2. Configure the **FC-10ETH (A)** to the Passive routing mode (see Section 4.3.1).
3. Disconnect unit **(A)**.

Unit **(A)** is configured to the Passive mode.

4. Connect the **FC-10ETH (B)** 12V DC power adapter to the power socket and connect the adapter to the mains electricity.
5. Configure the **FC-10ETH (B)** to the Active routing mode (see Section 4.3.2) and then Disconnect unit **(B)**. Make sure that the:
   - Destin. IP set in unit **(B)** is identical to the IP address on unit **(A)**
   - Destination Settings Area for CHANNEL 1 and CHANNEL 2 of unit **(B)** are set to be identical to the Port numbers in the Local Ports on CHANNEL 1 and CHANNEL 2 or according to the connections we want to establish with unit **(A)**

Unit **(B)** is configured to the Active mode.

6. Connect units **(A)** and **(B)** to your network or Ethernet router, as illustrated in Figure 9.

7. Connect up to two machines, that is, the RS-232:

   - COM 1 port of the **FC-10ETH (A)** to the RS-232 port of your machine 1 (for example, a Kramer machine) via a null-modem adapter
   - COM 2 port of the **FC-10ETH (A)** to the RS-232 port of your machine 2 (for example, a Kramer machine) via a null modem adapter (alternatively, you can connect the RS-485 port of unit **(A)** to the RS-485 port of your Kramer machine).

     To connect the RS-485 port, connect PIN A to the "A" (+) PIN and PIN B to the "B" (–) PIN

8. Connect up to two serial controllers to unit **(B)**:

   - Connect the RS-485 terminal block of the serial controller (1) to the RS-485 terminal block port on the **FC-10ETH (B)**

     Alternatively, you can connect an RS-232 output terminal block of the serial controller to the RS-232 COM 2 port of the FC-10ETH
   - Connect the RS-232 port of the serial controller (2) to the RS-232 COM 1 port on the **FC-10ETH (B)**

9. Connect the power on each of the devices as follows:

   - The Kramer machines
   - **FC-10ETH (A)**

     Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity
   - **FC-10ETH (B)**

     Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity
   - The serial controllers

A connection will be established after the user sends the first command from the serial controller to the serial controlled device.

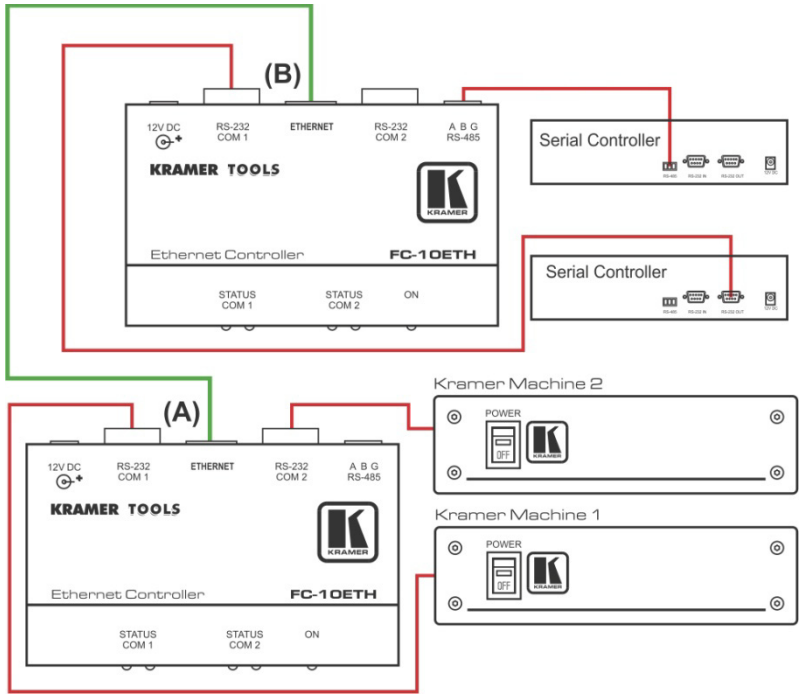

Figure 9: Connecting the FC-10ETH in the Active Routing Mode

6 Flash Memory Upgrade

The **FC-10ETH** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes!

The process involves:

- Downloading the upgrade package from the Internet
- Connecting the PC to the RS-232 port (COM 1)
- Upgrading the firmware

6.1 Downloading from the Internet

You can download the up-to-date file from the Internet (file names are liable to change from time to time). To do so:

1. Go to our Web site at http://www.Kramerelectronics.com and download the file: *fc10eth_11.zip*" from the technical support section.
2. Extract the file *fc10eth_11.zip*" package, which includes the KFR-Programmer application setup and the *.s19* firmware file, to a folder (for example, C:\Program Files\KFR Upgrade).
3. Install the KFR-Programmer Application.

6.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on the **FC-10ETH**, do the following:

1. Connect the RS-232 9-pin D-sub port (COM 1) on the **FC-10ETH** to a null-modem adapter and connect the null-modem adapter with a 9-wire flat cable to the RS-232 9-pin D-sub COM port on your PC.
2. Set the PROG dipswitch to ON.
3. Connect the power on your machine.

6.3 Upgrading Firmware

Follow these steps to upgrade the firmware:

1. Double click the KFR-Programmer desktop icon.
   The KFR-Programmer window appears (see Figure 10).

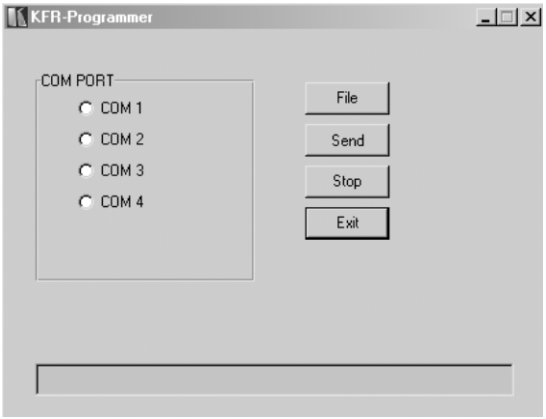

Figure 10: The KFR-Programmer Window

2. Select the required COM Port to which the **FC-10ETH** is connected on your PC.
3. Press the File button to select the *.s19* firmware file included in the package.
4. Press the Send button to download the file. The Send button lights red.
5. Wait until downloading is completed and the red Send button turns off.

7 Technical Specifications

ETHERNET INTERFACE:	10/100 BaseT Ethernet
SERIAL INTERFACES:	2 RS-232 connectors, signals: RX, TX, RTS, CTS, Ground on 9-pin D-sub ports 1 RS-485 on a detachable terminal block connector
NETWORK PROTOCOLS:	ICMP, ARP (ping), TCP, UDP
POWER SOURCE:	12 VDC, <80mA
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 2.95" x 0.98"), W, D, H
WEIGHT:	0.3kg. (0.25lbs) approx.
ACCESSORIES:	Power supply, mounting bracket
OPTIONS:	RK-3T 19" rack adapter
Specifications are subject to change without notice Go to our Web site at http://www.kramerelectronics.com to access the list of resolutions	

LIMITED WARRANTY

We warrant this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by us or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: “Radio frequency devices Subpart B Unintentional radiators”

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com

SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing